

University of Massachusetts Amherst
ScholarWorks@UMass Amherst

Landscape Architecture & Regional Planning
Faculty Publication Series

Landscape Architecture & Regional Planning

January 1992

The reconstruction of Lisbon following the earthquake of 1755: a study in despotic planning

John R. Mullin

UMass Amherst, jmullin@provost.umass.edu

Follow this and additional works at: https://scholarworks.umass.edu/larp_faculty_pubs



Part of the [Urban Studies and Planning Commons](#)

Recommended Citation

Mullin, John R., "The reconstruction of Lisbon following the earthquake of 1755: a study in despotic planning" (1992). *The Journal of the International History of City Planning Association*. 45.

Retrieved from https://scholarworks.umass.edu/larp_faculty_pubs/45

This Article is brought to you for free and open access by the Landscape Architecture & Regional Planning at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Landscape Architecture & Regional Planning Faculty Publication Series by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

The Reconstruction of Lisbon Following the Earthquake of 1755: a study in despotic planning

John R. Mullin

Department of Urban Planning, University of Massachusetts, Amherst, MA, USA

This paper is a description and analysis of the plan for the rebuilding of Lisbon following the earthquake of 1755. This tremor was so devastating that the entire city centre, the Baixa, ceased to exist. From this chaos emerged the Marquês de Pombal who, with the approval of the King, immediately brought order and began to develop efforts to create the new Lisbon. The effort first focused upon the development of four options that included rebuilding the city as it was, reconstructing the city with minimal improvements to the street pattern, undertaking a total rebuilding effort or starting fresh on a new site. After considerable analysis, Pombal selected the option to build under the 'clean slate' option. After selection of this option, the planners created six detailed plans. After considerable review, the dos Santos concept was selected. These six plans, designed largely by military engineers, were created with the intent of furthering Pombal's goal of creating a city that reflected new values. The city was to reflect a society in which the citizen, the merchant and the bureaucrat took precedence over the crown, church and nobility. The results were indeed a new Lisbon.

Introduction

The revitalization of a city following a calamitous event represents an unparalleled opportunity to reshape its form in accordance with new design standards and cultural ideals. At times the opportunity has been largely wasted (e.g. London's Wren Plan following the Great Fire), at times it has resulted in haste and mediocrity (e.g. Frankfurt and Warsaw after World War II), at times it has been evolutionary (e.g. the reclamation of tidal lands as part of the flood prevention programme around Amsterdam) and at times it has amounted to the beginning of a new order. Such was the result of the plan for Lisbon following the earthquake of 1755. This earthquake was so severe that it is still featured in standard textbooks on geology. Perhaps more interestingly, it is most known for its critical part in Voltaire's *Candide*, which is still standard reading in most universities in Europe and the United States. Who can ever forget Dr. Pangloss' acceptance of Nature's will in the face of such havoc? While trained in the Vaubanesque school of fortification thought, the results are not reflective of this influence. However, beyond science and literature, the new plan for Lisbon is of equal importance to city planning historians for three reasons. First, it represents the embodiment of a carefully developed, top down process that rejected past values and forms in order that the city would reflect the most modern thought possible. Secondly, the form of the city was developed to reflect new values. Lisbon was no longer the city of the King, Cardinal Patriarch and the nobility. It was to be the home of the people's government, the merchant and the middle class. Thirdly, it was largely designed by an autocratic leader and military engineers trained in the Vaubanesque tradition yet there is little in the plan that called for designs such that, as examples, troops could be garrisoned therein or that rapid deployment to the far points of the city could occur. If one seeks an answer to the

question of where is there a militarily derived plan that is not reflective of military concepts, then the answer can be found in the Lisbon Plan of 1755-56.

This paper is a description and analysis of the development of this Plan. It begins with a brief overview of the impact of the earthquake on Lisbon, discusses the conceptual thinking that was applied to the various options, describes the six alternative plans that were developed and then reviews the results.

The earthquake

At 9:40 a.m. on 1 November, All Saints' Day, 1755, an earthquake struck the city of Lisbon, Portugal, with such force that within a matter of minutes, the city's central core, the Baixa, was reduced to rubble [1]. After three major aftershocks, a tidal wave that raised the Tagus River approximately 20 feet, raging fires, looting and pestilence, the core of the city was left virtually uninhabitable [2].

Although no accurate death count was ever determined, of the 250,000 people living in Lisbon at the time, it was estimated 10-30,000 died as a result of the tremor, the fires and subsequent diseases [3].

Virtually all of the City's major structures suffered extensive damage [4]. Of Lisbon's 40 churches, all sustained some structural damage while 35 were completely destroyed. Of the 75 convents only 10 were left intact. One of seven old-age homes remained inhabitable, and none of the prisons or hospitals escaped unscathed. Nor was the nobility spared: 33 palaces were reduced to rubble, most of which were focal points to the neighborhoods in which they were situated. The Arsenal, the River Palace, the Royal Library and the Patriarchal Palace were all destroyed. Perhaps most startling, of approximately 20,000 housing units in the city, only 14,000 remained habitable. While no exact tally of the total losses was ever made, it was estimated that approximately 10% of the nation's wealth was consumed by the earthquake's devastation [5].

The greatest damage occurred in the Baixa. Authentically reminiscent of the Middle Ages with its narrow streets, winding alleys and densely packed wooden housing, the Baixa (literally translated as 'Lower Town') was built on alluvial soft soils and Miocene fine sands and surrounded by steep hills on three sides. This combination of structural, spatial and soil characteristics created a set of conditions that, once the tremor struck, caused the Baixa to collapse inward upon itself [6]. And with it came havoc to the commercial, financial, judicial, bureaucratic and royal centre of the Portuguese nation and empire.

King José I (1717-77) and his court escaped since they were in Belém, three miles from the centre of Lisbon, when the tremor struck [7]. Upon hearing of the rubble that was once Lisbon, the King, at wit's end (so the story goes), turned to his assembled nobles and asked what could be done to combat this 'Infliction of Divine Justice'? Amidst much hand wringing and urging of more fervent prayer came the alleged and legendary response of his Minister for Foreign Affairs, José de Carvalho e Mello (later to obtain the title of the Marquês de Pombal and by which he is referred in this paper): 'Bury the dead and feed the living' [8]. The King was so awestruck at Pombal's calm and rational response that he quickly directed Pombal to take charge of bringing order back to the city [9].

With the King's approval and powers of martial law, Pombal took immediate action. Within a matter of days, a food distribution system, the interment of the dead at

sea (even with the cooperation of an often reluctant Catholic clergy) and the establishment of law and order were all undertaken according to his direction [10]. The army was deployed to prevent people from fleeing the country, looters were summarily hanged, and pleas for special treatment from the nobles and clergy were ignored [11]. Pombal quickly became a heroic figure among the Portuguese people, a phenomenon that has made it exceedingly difficult to ascertain what he actually accomplished during the immediate aftermath of the earthquake. However, there is no doubt that his efforts effectively started Lisbon on the road to recovery.

Pombal gained his power through a combination of opportunity, ambition and skill. At the time of the earthquake, he was Secretary of State for Foreign Affairs and War, a position he had held since 1750 [12]. This position, along with the Prime Minister and the Secretary of the Navy, was at the pinnacle of power in the Portuguese national government. However, Prime Minister Pedro da Mota, sick and ageing, scarcely had the ability to oversee the government in stable times, let alone after a catastrophic earthquake. Diogo da Mota, Secretary of the Navy, was both a weak administrator and courtier who fled in panic once the earthquake struck. Thus, of the triumvirate, only Pombal was able to keep his wits and react sensibly [13].

There was also a great degree of understanding between the King and Pombal. In the beginning of his reign, King José I was dutifully attentive to the monarchical obligations. Over time, noting that Pombal was able to govern effectively without him, the King turned to the more pleasant activities of royal life such as hunting, riding or going to the opera. After the earthquake, the King tuned increasingly to religious activities. Thus, with the King's confidence and lack of interest in day-to-day affairs of state, Pombal, with great skill, was able effectively to control governmental operations [14].

The only countervailing efforts to control Pombal's powers came from the nobles who generally regarded him as an upstart, and the Jesuits who perceived him as a threat to their position of influence [15]. Both groups made various attempts to diminish Pombal's power and both failed. In a series of deft and often brutal moves, Pombal was ultimately able to eliminate them as competing powers and gain virtually absolute control over the Portuguese nation.

Concept planning

Toward recovery

Pombal began to prepare for the reconstruction of the city within a matter of weeks following the earthquake [16]. He organized a triumvirate of ministers to report to him on all aspects of life in the city [17]. Subordinate to this group, he appointed 12 magistrates with strong powers to govern the dozen districts in the city [18]. Once this organization was in place, Pombal was able to assign others to handle short-term emergencies and began to focus on rebuilding the city [19].

A four-part strategy set the stage for the re-planning of the city. First, due to the extensive damage to property and lost records, he directed that an inventory of the exact description and measurement of all houses, offices, shops, public spaces, roads and barrios be undertaken. This task was particularly difficult, in the light of the fact that the streets were often little more than cow paths and there were frequently competing claims

for the same property. Without this information, however, no fair means of adjudicating property disputes could occur [20].

Secondly, needing to find shelter, people began to build huts, shacks and shanties outside the city walls with little concern for property lines or civic order. Pombal was concerned with the ramifications of these actions on the long-term development of the city. Since no plans for the area had yet been created, he strictly prohibited all construction outside the old city walls [21]. Within the Baixa, a similar phenomenon was occurring: there was a rush on the part of the owners to reconstruct as rapidly as possible with little regard for site planning, hygiene and density limitations. Pombal and his staff realized that unless this rush was controlled, the city would be even more chaotic than before the earthquake. In response, he issued a decree on 30 December 1755, prohibiting building within the city while the aforementioned inventory was being undertaken [22]. This decree lasted until 12 February 1756, until he was forced, by public pressure, to lift the prohibition [23]. Pombal refused to be stopped, however, and insisted on 16 September 1756 that all structures must be built to officially approved standards and still later, on 8 October 1760, he ordered the demolition of all buildings that did not meet planning specifications. (Few people ever won an argument with the person whom various authors have compared to Richelieu, Colbert, Haussmann and Cromwell [24].

Thirdly, there was the question of how best to finance the rebuilding of the city. Several European nations provided a source of funds that helped to start the recovery. An enormous contribution of gold and diamonds from Brazil was also obtained and the nation's gold supply was not harmed by the tremor. To complete the financing, Pombal exacted a 4% tax on manufacturing and merchandising [25].

Thus, in these early stages Pombal began to procure information, to protect undeveloped areas, to ensure orderly, planned development in the Baixa, and to obtain funding to finance the reconstruction effort. The seeds for the reconstruction were quickly planted and began to bear fruit rapidly.

The architects: wisdom, utility and style

In order to understand the roots of the design and planning efforts that governed the reconstruction of the Baixa, it is necessary to understand the contributions of the King João V era (1706-50) to the tastes and styles of the nation. During his reign the nation had experienced a dramatic increase in affluence and prosperity [26]. With gold and diamonds flowing into Portugal from Brazil, the King embarked on a building splurge across the country. Many of these structures were built in the rich and ornate Baroque traditions as seen in the works of Bernini, Borromini and Juvara [27]. Of all projects undertaken, two of the most impressive in Greater Lisbon were the Palácio Nacional at Mafra (1717-30, 1752, 1794) and the aqueduct of Águas Livres (Free Waters) built between 1729 and 1748. The story of Mafra and its influence on Portuguese design is beyond this paper. The following figures, however, illustrate its importance: over the span of 13 years, between 20,000 and 50,000 workers, under the control of 6,000 soldiers, toiled on a project that included a basilica, palace, monastery, convent, hospital, library, chapels and monks' cells [28]. Designed by Frederico Ludovice (1670-1752) in an enormous grid-iron pattern, it was and still remains one of the largest construction projects in the history of the nation. Its significance, apart from its massive size, is twofold. First, it established the Baroque as the prevailing style in the country for the

first half of the century. Secondly, it served as a training ground for the nation's architects, engineers, sculptors and other craftsmen for decades. Many of these artists and craftsmen eventually assumed positions of authority and responsibility in the reconstruction efforts that followed the earthquake.

The second and more practical project was the construction of the famed aqueduct of Águas Livres [29]. Designed by Custódio Vieira and engineered by Manuel da Maia between 1729 and 1748, the aqueduct extends over 61,000 linear feet and is carried by 109 arches of 'Pedra Liz'. Characterized by Gothic vaulting and clean, strong lines, this structure was one of Europe's 18th century engineering marvels [30]. Like Mafra, it served as a training ground for the craftsmen who later assisted in the rebuilding of Lisbon. In its simplicity, it provided a startling counterpoint to the frivolous, expensive and ornate structures at Mafra.

Both of these projects are representative of cultural pressures at work in Lisbon at mid-century. Mafra represents the Crown, religion, absolutism, excess, the Baroque and the ornate. The Águas Livres represents the state, the secular, the people, utility and relative simplicity. These pressures continued to be felt in the aftermath of the earthquake. After all, the architects who were responsible for the implementation of these projects were later responsible for Lisbon's future.

Pombal assembled a team of designers to guide the rebuilding of the city who were representative of a cross-section of eighteenth century Portuguese design history. The person who was responsible for the conceptual development of the plan, and the eldest of the group at 83 years of age, was General Manuel da Maia (1672-1768). Royal Engineer-in-chief, Maia had had a wealth of experiences that made him a logical designee. Trained in the Vaubanesque style of military fortification, architecture and engineering of the late seventeenth century/early eighteenth century, director of the Academy of Fortification (Aula de Fortificação), extensively experienced in developing projects through the reigns of three kings, and author of a previously unimplemented plan of Lisbon, he was well-grounded in the problems that were facing the city [31]. He was extremely respectful of the Spanish Mannerist style with its serious and moralistic overtones – a point which would become significant in the Proto-Classical revival in Lisbon [32]. In effect, Maia represented a link to the past, to tradition and to a period when the monarch was absolute.

Below Maia in rank were Captain Eugénio dos Santos (1711-60) and Lieutenant Colonel Carlos Mardel (1695-1763). These two military engineers were responsible for overseeing the creation of the plan and its implementation. Beyond the fact that both held a military commission, they were quite different people. Santos, aged 45 at the time of the earthquake, was a former student of Maia's, architect to the Senate, and director of the Aula Civil do Paço da Ribeira, the civilian equivalent of the Aula de Fortificação [33]. Pragmatic and fully committed to the need for efficiency and speed, Santos must be most credited with understanding Pombal's visions of a new society in a physical sense. It is through Santos' work, with its emphasis on utility, simplicity and repetition that we can see the most extensive and sophisticated adaptation of 'plain architecture' undertaken in any Portuguese city [34].

If Santos represented utility, then Carlos Mardel signified style. Mardel, aged 60 and Hungarian born, was sophisticated, worldly and comfortable at court. In many ways his work was an effort to move the revitalization programme from emphasizing the

simply recreation of the barracks, the military parade ground and pure utility. Among the three architects, it was Mardel who displayed a willingness to experiment with new design approaches; a grounding in European styles and a sensitivity to the Baroque characteristics of Lisbon in the first half of the eighteenth century also provided an understanding of the need for radical simplicity in the revitalization effort [35].

Thus, directing the staff responsible for guiding the future of the city were three military men, all architectural engineers, and all well versed in the need to balance the idiosyncrasies of Crown and court with the needs of the people. Each born a generation apart and comfortable with concepts of design that were at times quite disparate, it is these three men that ultimately guided the rebirth of Lisbon, a city where old and new values were in conflict and where the Crown and court, while still powerful, had to face a rising merchant class and bourgeoisie. In effect, they were required to move Lisbon from being the last of the medieval cities to the most modern of the Renaissance cities. No easy task!

Over time, new men emerged to guide the effort, many of whom were trained by Maia or Santos. This 'second tier' of architects and engineers included: José Monteiro de Carvalho who was responsible for demolition and nicknamed the 'destroyer' (Bota Abaixo); João Pedro Ludovice, son of the Mafra architect; and Reinaldo Manuel who replaced Santos in 1763. Thus, throughout Pombal's post-earthquake years as Prime Minister (1755-77), a sense of continuity was maintained [36].

The framework

On 4 December 1755, the Duke de Lafões was informed that Maia had begun the replanning of the city. Over a period of six months, Maia submitted three concept papers (dissertations) to Pombal outlining site planning, construction and design options [37].

Four site planning options were offered concerning the rebuilding of the city, each designed by a different team of architectural engineers [38]. The first was the 'no change' option which emphasized rebuilding the city as closely as possible along existing street lines and at the same density. The second centered on a widening of the streets but with little change in densities. The third and most radical, called for the total demolition ('clean slate') of the core of the Baixa and reconstruction along a new road pattern, at a lower density and with new construction standards. The final option called for a new capital to be built near Belém. Acceptance of this idea would have led to the abandonment of the old city [39].

Maia provided an analysis of the positive and negative features of each option. The 'no change' option was the least disrupting. Property would not have to be re-parcelled, roads reconfigured or densities changed. On the other hand, the structures would remain earthquake prone and the opportunities for sanitary improvements would be lost. The 'road widening' option had merit in that it would ease transportation movement and provide more sunlight and airflow. However, it would still require the confiscation of some land while structures would continue to be placed in high density configuration. Further, the structures would still be sensitive to damage by another earthquake [40].

The 'clean slate' option provided an opportunity to create a modern city – one in which the infrastructure, the design of the buildings, the construction techniques, and the site planning would meet the needs of the modern capital city of an empire. However,

this option also had several negative features, including the demolition of sound existing buildings. (Among these were, ironically, Pombal's home, the one Protestant Church and the brothels [41]). This demolition would have occurred at a time when housing was critical and the citizens were pressing to build new dwellings. Conditions, then, would become worse before they improved. This option, with its proposed lower density, meant that the city would have to spread out beyond its walls. Pombal considered this undesirable.

The 'new site' option would have caused great hardship. In effect it would have ignored the human suffering of the dislocated, would have created a legal nightmare concerning property rights and would send a psychological message to the people still living in the city that they were being abandoned. In short, it would be an arrogant, 'Royal' solution – one in which imperial form would take precedence over the needs of common people. At the same time, however, there were some assets to the approach. The new city would be totally modern; not encumbered by existing property lines, structures or roads; it could be built quickly and it could be built using the latest construction techniques.

What motivated Maia in the development of his concepts? It is known that he was quite concerned about the possibility of recurring earthquakes [42]. Since he had been an active worker in the earthquake's immediate aftermath, he could not have missed noticing the propensity for the 4- and 5-story buildings collapsing into the street (where people had gathered for safety – to no avail) [43]. Such concerns clearly motivated his desire for lower building heights, the elimination of arches and arcade, and the use of masonry and framed construction techniques.

Maia had also realized that there was a need to move people and carriages quickly and freely through the streets. With the rabbit's warren of paths and streets, movement was time consuming and difficult. This problem was noted by Maia as early as 1741 when he requested King João V to replot the streets surrounding the Church of Santa Isabel. In this instance he requested wider streets, built to a standard, to allow the walking public and carriages to move freely and safely [44].

Maia was inspired in his ideas by the revitalization of London after the Great Fire of 1666 and the plan for Turin developed for King Sarno by Ivvaro [45]. What specifically he gained is unknown. It is known that Wren's plan for London, despite having been created in the previous century, addressed many of the problems facing Lisbon. It is also known that Pombal was familiar with London, having served as Portugal's ambassador to England [46]. Concerning Turin, the concepts applied to that new city would have had direct application if the capital was relocated to Belém. The Turin plan called for building a new capital immediately adjacent to the old. However, neither example offered help in terms of addressing the personal hardships of the people.

Maia, in retrospect, seemed ambivalent in his feelings toward the future of the city. He was appreciative of tradition, of the need to promote the image of the nation and the crown as well as the need to maintain the unique Lisbonese quality of life. On the other hand, he was a practical engineer who saw the need to modernize and utilize the most advanced technological innovations. All of his options involved sacrifice. Maia presented his ideas to Pombal who, after careful review, selected the 'clean slate' option. Maia thus had his orders [47].

The six plans

Maia assembled six military architect/engineers to develop alternative plans for the Baixa. Arranged as two person teams, he directed each to focus on a specific concept and, as well, to mutually share their design ideas. After the first three approaches were created, he shuffled the teams and asked for three refined plans from which one would be accepted.

The goal of the first plan, as developed by Gualter da Foneca and aided by Pinheiro da Cunha, was to develop a scheme that related as much as possible to the layout of the city before the earthquake. The dimensions of the old structures would remain the same but the roads and the squares were to be realigned. The plan needed to address the fact that the Baixa had been laced with more than 40 streets and 70 lanes. Ever the engineer, Fonseca proposed the virtual elimination of the curved street from the area and even called for the straightened realignment of streets in the hills to the east and west where there was minimal damage from the tremor.

The plan had certain positive attributes. It was minimally disruptive and quickly implementable. Former residents would have a clear understanding of where their properties were and how they could build. Further, the cost to the crown in terms of civic improvements would have been minimal, simply rebuilding the institutional structures in the same areas as they were before the earthquake.

But would this plan help Lisbon to become a future-looking city and take its place among the capital cities of the Enlightenment? The plan did not reflect the need for modern sanitation, the overcrowded living conditions and the grandeur required for the capital city of a world empire. In fact one of its most damning features was its 'pedestrian' nature and the absence of grand avenues, royal squares and monumental structures.

It would appear that Maia had little serious intention of ever accepting this approach. With its minimal changes and failure to address the needs of a changing city, it was far more an exercise in explaining why 'Antiga Lisboa' could not be resuscitated than in proposing a reasonable alternative for reconstruction. By revealing the absurdity of looking backward, he hoped to eliminate doubt concerning the validity of the more modernistic proposals.

The second plan, directed by Captain Elias Sebastião Poppe, and aided by his brother José Domingues Poppe, was not bound by any factors designed to retain the character of the old city. Maia directed him to develop a plan with a completely new street system which included wide avenues. Poppe chose to create a scheme marked by rigid rectangles of various sizes. Three wide avenues interlaced the Baixa along with seven cross streets. Only one of the avenues connected the city's two major squares, the Terreiro do Paço and the Rossio. Poppe chose not to impose the new street pattern on the little damaged Alfama district to the east.

The Poppe Plan represented a significant departure from Fonseca's Plan. It was at once utilitarian with its repetitious row on row of blocks and an abstract step toward the enlightened city with its emphasis on ease of movement, sunlight and airflow. Above all, it was a dramatic announcement that it was possible to create a new community based upon the standards of the time within the heart of an old city.

The goal of the third plan was to synthesize the ideas formulated by Fonseca and Poppe. Developed by dos Santos and aided by A.C. Andreas, the plan included three

major avenues that connected the Rossio to the north and the Terreiro do Paço to the south. There were five cross streets of different widths. Equidistant between the two squares was an open plaza that provided the opportunity for monuments and a means to visually connect to the edges of the Baixa.

Dos Santos' plan is the only one that attempts to forge strong connections with the Terreiro do Paço to the Baixa and where the square obtains a sense of articulation. Above all, the plan maximized access to the sea and provided a clear sense of entrance to the centre of the city. His plan began, in a rudimentary manner, to focus on the crucial elements of structure, topography, function and nature.

If one looks at the three plans as a progression from simple solutions to an increased sense of sophistication then one can easily understand why the dos Santos plan was of the greatest interest to Maia. In fact, the scheme for the Terreiro do Paço developed by dos Santos caused a shift in Maia's concepts. From the very beginning he expected that the Terreiro do Paço would remain important as a civic space but that the Rossio would become the new 'Royal Square': its location was in an area of likely growth and several royal buildings were being proposed along its edges [48]. However, dos Santos' ideas for the Terreiro do Paço so captured the imagination of Maia that from then on he directed all his architects to treat it as the Royal Square and to focus on the Rossio as a space for mercantile activity.

There were some problems, however. The purpose of the new central square was never fully explained and the rationale for the differing widths of the streets was unclear. Above all, it raised significant discussion at the highest levels of government because it called for the partial taking of properties belonging to the Church and the nobility, two groups with whom Pombal was already in conflict. This alone was almost reason enough to cause its rejection as an alternative!

From these three plans Maia was able to grasp increasingly detailed concepts for the city plan. However, none of the three submitted proposals was acceptable. Thus, with the intent of further stimulating creativity he reconstituted the teams. They were once again prepared under the direction of Fonseca, Poppe and dos Santos.

The Fourth Plan, as developed by Fonseca, was unrealistic and bordered on fantasy. In plan view, it takes on the image of a pyramidically formed wedding cake with an empty ill-defined Rossio at the top; a series of streets and blocks laid out with parade ground rigidity in between and, a base consisting of massive blocks of building in the Terreiro do Paço.

Despite its rigidity, the plan met many of Maia's concerns. Ease of movement, access to sunlight for long periods, opportunities for air flow and logical reparcelization were all accommodated. Yet it was insensitive to the terrain, the waterfront and the need for open space. The plan had so many castrum-like qualities that in a final analysis it would have been more fitting in a fortress than as the heart of a world-class city.

The sixth plan prepared by Poppe was imaginative, with some small blocks, some sense of monumentality, some elements of a radical plan and, interestingly, a recognition that the curved street could still be utilized as a design feature. What is most striking is the placement of two churches; a newly-sited structure (as opposed to one rebuilt on a pre-earthquake site) at a halfway point between the two squares and a massive patriarchal cathedral proposed for the Terreiro do Paço. Its greatest weakness was the redesign of the Terreiro do Paço: Poppe chose to enclose the square such that it became

predominantly inward looking. It would have been tethered to the Baixa by connections to three avenues but with little sense of drama. Perhaps of more importance, structures were proposed almost to the edge of the Tagus, creating a feeling that Lisbon was turning its back to the sea.

The fifth plan prepared by dos Santos, with assistance and later corrections by Carlos Mardel, was simple yet dynamic. Dos Santos proposed realigning the squares and streets by 13° such that maximum opportunities for afternoon sunlight could occur. At the same time, he proposed that the shape of the Terreiro do Paço be changed so that it would intrude more deeply into the Baixa itself. While this eliminated the possibility of placing up to three blocks of buildings in the business area, it provided the strong linkage between the Baixa and the Terreiro do Paço that was required and created ample space for monumentality while maintaining an openness to the river. At once ceremony, iconography, commerce, bureaucratic functions and everyday human interaction were served.

The design of the streets was different from the other proposals and contributed to a sense of dynamic unity. The plan called for five major north – south streets, two of which connected the squares. Between these two ‘Ruas Nobres’, were three narrow streets that ended several blocks before the Terreiro do Paço. Concerning the layout of buildings, Santos divided the blocks into two rectangular forms, the top five blocks having elongated north – south sides and the lower two blocks having elongated east – west sides.

A radically different urban dynamic was at work that included unique block patterns, variation in road widths, lengths and end points, in addition to a redesigned Terreiro do Paço. The reorientation of the Baixa allowed for additional sunlight while new space for monuments was also created. With ease of movement, standardized lots, easy parcelization, only minimal church relocation and opportunities for monumentality, Santos’ plan met all of the basic conceptual objectives set by Maia and became the basis for the ‘Baixa Pombalina’.

Towards an iconographic understanding

Introduction

Within the context of the reconstruction plan for Lisbon, Pombal created a theatre in which the city was the ‘stage’ – one employing subtlety, drama, tragedy, and tragic-comedy. The plan, manipulated by a director not far from centre stage, resulted in a radically-different power structure in Portugal. It is through the use of symbol and icons that this can best be illustrated. The most important ones are noted below.

Nature

If anything, the planning ethos that governed the plan for Lisbon, as an abstraction, focused upon the conquering of nature. Though the earthquake had, in effect, revealed its power over reason; Christianity had taught man to conquer nature. It was the duty of the State, as the people’s secular interpreter of reason and protector of the nation’s welfare, to show that it was making an effort to reinstate Man’s power over the elements.

This is reflected, for example, in the grid-iron layout of streets. This design was not common to any of the Portuguese cities during the eighteenth century, did not fit into the natural contour of the Lisbon landscape, and did not, in any way, lend itself to resolving questions of property realignment. In essence, the grid-iron pattern was a foreign concept that was brought to Lisbon as an expression of the will of the state. There was nothing natural about it. To impose such a design on a city that was so organically patterned before the earthquake was to announce that a new order was at work.

The grid-iron design was far more reflective of the thoughts of Vauban, the ideals of the Law of the Indies, and the Roman Castrum than the creation of the British market towns, or the sense of 'Heimat' found in German cities along the Romantic Road. The Vaubanesque concepts emphasized that if nature was in the way of design, then nature would have to be changed. In Lisbon, we see this in the rejection of the natural landscape as the basis for site layout. More specifically, the hills of Lisbon to the east, north and west and the gentle rise of the Baixa called for a design that reflected the gentle curve, the subtle vista and a changing skyline that enabled sunlight and shadow to work their magic. Such design treatments were for another time and were not taken into consideration.

It was at the water's edge, where the River Tagus meets the city, that the striking juxtaposition of Man and Nature was most pronounced. As a ship's passenger moved along the Tagus toward port, one was aware of the movement of the ship and its relationship to Nature. The push or pull of the tide, the roll of the ship on the water, and the presence or absence of the wind were constant reminders that Nature determined when and to what degree of comfort he would arrive. As our passenger looked from the river toward Lisbon, he saw the urban landscape but would have been more conscious of the hills surrounding the city – that the city was situated in a natural cocoon. Indeed, as a whole, the hills would have dominated this comprehensive vista far more than the man-made structural elements of the city. It is however at the point of disembarkation that the sense of man conquering nature occurs: upon leaving the ship, the traveler is welcome by stone steps that lead up to the Praça do Comércio. It is here that he would receive a psychological message that he had now entered a world controlled by man. The tides, the moon, the water, the sun, and the wind were now seconded to the powers of rational humankind. The traveler was greeted by Machado's statue of the King (at greater than human scale) to the immediate centre, the houses of commerce and banking serving as anchors firmly implanted along the river's edge and the houses of law and bureaucracy beyond.

If this traveler, after walking up the steps, looked around with his back to the river, could he see anything natural? There were no running fountains, no green grass, no trees, and no flower beds. It was a design which totally imposed the will of man upon the land.

The Church

Perhaps the greatest change in terms of the rebuilding of the new Lisbon relates to the presence of the Church as a symbol.

It was no longer the age of cathedrals. At the same time, however, the physical design of the churches was important as a symbolic means of reflecting the greater glory of God. It was important that the church reflect permanence and sanctity and above all,

inspire awe in the congregation. It was the 'church mystical' with which the planners had to deal. One approach would have been to rebuild the churches exactly as they were before the earthquake, with their highly visible edifices dominating the secular structures of everyday life. Yet the high steeples and bell towers, the massive doors and the setting of these old churches constantly reinforced the notion that the Church was at least equal in power to the State. Here there is the classic conflict between Church and State: which institution would capture the hearts and minds of the people? Once divided, in what way can physical structures reinforce the primacy of one over the other? Pombal clearly wished to control the Church. His expulsion of the Jesuits and strict controls on the Inquisition are examples of these efforts.

In a physical sense his planners were also controlling the Church as symbol. No longer would there need to be a majestic Patriarchal Palace, no longer would there be a skyline dominated by church towers, and no longer would the churches be the focal point of each parish. There is no formal documentation from Pombal directing the planners to redevelop the churches in this manner. It is known, however, that the collapse of the church towers contributed to Maia's refusal to allow their reconstruction. It is also known that the symmetry of the site plan for the Baixa, in order to work, had to treat the churches in the same manner as all other structures. Regardless of the motivation, the fact remains that in a site plan, architectural and iconographic sense, the visibility of the Church was greatly diminished.

The statue

In the history of the evolution of Lisbon more is written about this statue than any other single architectural object. Pombal directed that a statue to King José I be designed and erected in the Terreiro do Paço. Its symbolism can be noted on several levels.

On the first level, Pombal required that the statue be designed and crafted by Portuguese artists. Prior to the design, it was customary to employ Italian and French sculptors for major works. Pombal was making an assertion that Portuguese designers were as talented as those found in the traditionally more cultured cities and nations.

The siting of the statue created a great degree of controversy regarding the direction the King should face. Should the statue be positioned inland towards his people or to the sea, the Portuguese empire, and traders entering his domain? The controversy was heightened due both to humorous and serious discussion about the backside of the King's horse. Was a subtle message being sent to the people of Lisbon with their view focusing on the animal's back side?

At a second level there were some issues concerning the formal name for the square. Pombal changed the name from the Terreiro do Paço to the Praça do Comércio (Plaza of Commerce). This was significant in several ways. For one, merchants were bearing an immense responsibility in terms of the cost of recovery and, for this alone, deserving to be celebrated. Further, over time, the Praça do Comércio had emerged as a centre of high mercantile trade. Therefore, there was little consternation over the re-naming of the square except for one subtle but important point: should it have the word 'real' (royal) in its title? For example, should it be the Real Praça do Comércio or the Praça Real do Comércio? Pombal, on several occasions, referred to the square in writing with the additional word 'real' in his text. Given Pombal's sense of directness, it would be hard to accept his words as being a slip of the pen. It appears that he was attempting

to place a royal stamp of approval upon the mercantilist efforts emerging in Lisbon during his rule. After all, even the rights of trade were dependent upon the approval of the King and his ministers.

Despite Pombal's efforts, direct, subtle or accidental, the fact is that the 'real' prefix did not catch on. The fact remained that this square, despite the King's monument and the presence of the imposing governmental structures, was simply not a royal place. This square was (and is) far more utilitarian than symbolic, more bourgeois than courtly, more mercantile than royal, and more bureaucratic than concerned with statescraft. While there is dignity, and a celebration of the crown, this square was (and is) the people's place. The formal name remained the Praça do Comércio.

Finally, we have the hubris of Pombal himself. Directly below the King, on the base of the statue, Pombal directed the placement of a medallion commemorating himself. While one cannot argue over the significant energy and actions taken by Pombal to save the state, one can state that the selection of subjects for commemoration are better left to others than oneself! (Interestingly, after Pombal was removed from power by Queen Maria, the medallion was removed. Years later, it was returned to its original position where it remains today).

There is little argument that the sculpture is a striking piece. It is dark when all around it is light and is bigger than life yet does not dominate.

Roads

The difference between old and new streets has already been noted. However, the rationale for naming the streets also warrants discussion. Pombal was extremely desirous of creating a strong sense of mercantilism in the city. In order to reinforce this feeling, the streets were named in such a manner as to encourage merchants to locate on the streets so designated. The long streets connecting the Praça do Comércio to the Rossio were named for the key marker functions to be undertaken. Cross streets represented the church and the side streets were named for members of the Royal family. The question that one must ask is why?

The fact that the long merchant streets connected two market squares subtly but directly made the point that this area of the city was designated for merchant activity. It was not proclamation, law or regulation but simply a designation of use by area. A unique concept for the time.

Lisbon as an abstraction

It is clear that the key importance of the Lisbon Plan, in an historical and a theoretical planning context, lies in the fact that it was developed as the physical symbol of the major change which the Portuguese nation was about to experience. This is illustrated by the attention given to the plans that followed the earthquake.

To begin with, there is the role of the nation-state in the reconstruction of the city. While one can point to rulers and royalty ranging from Jefferson to Prince Charles that have had an active general interest in city planning, it is rare when one becomes directly involved in the details and intricacies of plans and their implementation. Pombal's intent was to send messages to the King, nobles, church officials, the people, the colonists and the European nations that the Portuguese national government was in charge and acting on the needs of the state through its city building efforts. We must remember that

Lisbon, as a city, was many things: a residence of the king and nobility, the capital city of a nation and empire, a centre of trade, the seat of the Patriarch, and the home of approximately 275,000 people. The plan had to react in one way or another to the needs of all groups.

The plan rejects the concept that Lisbon is a royal city. Royal structures are clearly less significant and fewer in number than before the earthquake. Pombal, however, realized that his power rested with the Crown. Totally removing the royal presence, symbolic or otherwise, would have potentially resulted in a questioning of his loyalty. Pombal resolved this dilemma through the construction and placement of the King's statue in the Praça do Comércio. It is significant that there are no fawning, sycophantic nobility at his feet nor a phalanx of soldiers surrounding him. Instead we see the greater than human scale King astride his (then) black horse with common folks trading at his feet, surrounded by buildings in which mundane bureaucratic work was being undertaken. The message was that the King may rule but life goes on. Pombal's royal square was, in reality, the people's square.

Pombal was not nearly as accommodating to the nobility as he was toward the citizenry. The confidence that the King had in Pombal provides a clear depiction of a man who did not have to respond to the whims and whines of this group. His attitude toward the nobility is also reflected in the designs for the Baixa: the utilitarian, simple, economical structures hardly indicate that men and women of stature resided therein. Given the desire of the nobility for pomp and architectural grandiosity, the new Lisbon was not to their liking. Relatively few of the nobles built new estates in the city during Pombal's rule. As with the Praça do Comércio, the Baixa ultimately became the home of the tradesmen and mercantilist: these groups in essence were the new Lisbonian upper-class.

The most interesting part of the Lisbon planning effort, however, centres upon the role of the military. The plan was strongly regimental in form, was developed by military men, and the important architects all held military rank. But, where was the military? Lisbon was not a garrison city. It did not have the thousands of troops that were found in Berlin, was not designated in Vaubanesque fashion to serve as a Fostresstadt, and was not developed so that troops and cannon could easily move through the streets. To answer the question directly, the military presence was minimal, largely held to the Arsenal located at the edge of the Tagus.

A fundamental question emerges here: when is a military plan not militaristic? The answer may be the Lisbon plan. If one accepts standardization, utility, regimentation, order, simplicity, and efficiency as military traits alone, then this is a military plan. If one accepts them as pragmatic and practical solutions for a city desiring rationally to recover then it is not. I believe it is the later case.

In sum, Lisbon, as an abstraction, represented a vehicle for change. Pombal employed the opportunity to show that a new era had arrived. This new era no longer represented the power of the crown, nobility, and church. It now celebrated the merchant, bureaucrat and common man. Lisbon was indeed radically changed.

Notes and references

1. While there are many sources that examine the impact of the earthquake, the best, in the opinion of the author, is F.L. Pereira de Sousa, *O Terramoto de 1 de Novembro de 1755 em Portugal e um Estudo Demográfico*, Lisbon: Serviços Geológicas, 1919-32, 4 volumes. Also see J. Moreira de Mendonça, *História Universal dos Terremotos*, Lisbon: António da Silva, 1758, p. 113.
2. As noted in J. Smith, *Memoirs of the Marquis of Pombal*, London: Longman, Brown, Green and Longmans, 1843, p. 90; and J. Baretti, *A Journey from London to Genoa through England, Portugal, Spain and France*, London: T. Davies, 1779, Volume 1, p. 150.
3. These estimates were taken from F.L. Pereira de Sousa, *Efeitos do Terramoto de 1755 nas Construções de Lisboa*, Lisbon: Imprensa Nacional, 1909.
4. There was no formal census of the dead. Estimates ranged from 10,000 to 90,000 people. See J.A. França, *Lisboa Pombalina e o Iluminismo*, Lisbon: Livraria Bertrand, 1977, 2nd edn, p. 63.
5. This information was gathered from several sources including G. de Matos Sequeira, *Depois do Terramoto*, Lisbon: Academia das Ciências de Lisboa, 1916, Volume 1, pp. 25-27; O. Martins, *História de Portugal*, Lisbon: Guimarães, 1972, pp. 459-60; and França, 1977, *op. cit.* [4], pp. 57-74.
6. E.A. Gutkind, *Urban Development in Southern Europe: Spain and Portugal*, New York: Free Press, 1967, Volume III, p. 153.
7. J. de Castilho, *A Ribeira de Lisboa*, Lisbon: Publicações Culturais da Câmara Municipal de Lisboa, 1942, p. 153.
8. To this day, both the phrase and its source are open to question. Some historians have added the suffix 'and close the doors' or 'and shut the harbour'. Who actually said the phrase is unknown. Beyond Pombal, it has been attributed to such people as Pedro da Motta, Diogo de Mendonça and the Marquês de Alorna. See, for example, J. Lúcio de Azevedo, *O Marquês de Pombal e a Sua Época*, Lisbon: Seara Nova, 1922, p. 143.
9. As Ribeiro has pointed out, there was in reality no other minister that came close to the power base controlled by Pombal. Therefore, there was no other person to whom the King could turn. See A. Ribeiro, *A Renovação Pombalina*, in D. Peres (ed.), *História de Portugal*, Lisbon: Seara Nova, 1922, p. 143.
10. M. Cheke, *Dictator of Portugal: A Life of the Marquis de Pombal, 1699-1782*, Freeport, NY: Books for Libraries Press, 1969, pp. 66-68. For a summary of these acts, see S.J. de Carvalho e Mello, *Memórias Secretíssimas do Marquês de Pombal e Outros Escritos*, Lisbon: Publicações Europa-América, 1985.
11. C.R. Boxer, *Some Contemporary Reactions to the Lisbon Earthquake of 1755*, Lisbon: Universidade de Lisboa, Faculdade de Letras, 1956, pp. 8-10.
12. J.V. Serrão, *O Marquês de Pombal: O Homen, O Diplomata e o Estadista*, Lisbon and Oeiras: Câmaras Municipais, 1982-84, p. 72.
13. As the Duke de Chatelet wrote, "During his time, Portugal had no other minister; he monopolized all the important posts..." See P.M.F. Desoteux de Cornatin, *Travels in Portugal*, London: J.J. Stockdale, 1809, p. 138.
14. Boxer, 1956, *op. cit.* [11], pp. 8-10.

15. See C. Michaud, *Un anti-jesuite au service de Pombal: l'abbé Platel*, in M.H. Carvalho dos Santos (ed.), *Pombal Rvisitado*, Lisbon: Editorial Estampa, 1984, pp. 387-402; and B. Duhr, *Pombal: Sein Charakter und Sein Politik: Ein Beitrag zur Geschichte des Absolutism*, Freiburg in Briesgau: Herder Verlagshandlung, 1891, pp. 106-41.
16. E. Freire de Oliveira, *Elementos para a História do Município de Lisboa*, Lisbon: Tipográfica Universal, 1906, p. 48.
17. Serrão, 1982-84, *op. cit.* [12], p. 73-4.
18. M.J. Domingues, *O Marquês de Pombal; O Homem e a sua Epoca*, Lisbon: Livraria Romano Torres, 1963, p. 171.
19. Martins, 1972, *op. cit.* [5], pp. 461-62.
20. Sousa, 1909, *op. cit.* [3], p. 43.
21. Melo, 1985, *op.cit.* [10], p. 101; França, 1977, *op.cit.* [4], p. 71; and G. de Matos Sequeira, *A Evolução da Cidade*, Lisbon: Câmara Municipal de Lisboa, 1935, p. 18.
22. J.H. Saraiva, *História Concisa de Portugal*, Lisbon: Europa-América, 1978, p. 47.
23. See A. Patrício de Lisboa, *Memórias das Primeiras Providências que se derão no Terramoto que padeceo a Corte de Lisboa no Anno de 1755*, Lisbon, 1758, pp. 324-25.
24. C. Castelo-Branco, *Perfil do Marquez de Pombal*, Porto: Porto Editora, 1962, introduction; J. Law, *Paralléle entre le Marquis de Pombal et le Baron Hausmann*, Paris: Chez Amyot Libraire – Éditeur, 1869, p. 35; and Duke de Chatelet, 1809, *op. cit.* [13], p. 142.
25. For the English reaction to this tax see Cheke, 1969, *op. cit.* [10], 83-84. Also see Boxer, 1956, *op. cit.* [11], p. 18 and A.H. Oliveira Marques, *History of Portugal*, New York: Columbia University Press, 1976, 2nd edn, pp. 389-92.
26. See J. Lúcio de Azevedo, *Idade de ouro e diamantes* (Chapter 6) in *Épocas de Portugal Económico*, Lisbon: Livraria Clássica Editora, 1973, 3rd edn.
27. R.C. Smith, *The Art of Portugal 1300-1800*, London: Weidenfeld and Nicolson, 1968, p. 101.
28. R.C. Smith, *The building of Mafra*, *Apollo*, 97 (1973), 360-66. Also see R.C. Smith, *João Frederico Ludovice and eighteenth century architecture in Portugal*, *The Art Bulletin*, 18 (1963), 273.
29. For laudatory comments about the aqueduct see Barette 1770, *op. cit.* [2], p. 182, and J. Murphy, *Travels in Portugal*, London: Strahan, 1795, p. 179.
30. Rarely have the Portuguese received praise for their architecture. However, their engineering accomplishments have received extensive praise. See, for example, M. Dieulafoy, *Art in Spain and Portugal*, New York: Charles Scribner's Sons, 1913, p. 315.
31. See C. Ayres, *Manual da Maya e os Engenheiros Militares Portugueses no Terremoto de 1755*, Lisbon: Imprensa Nacional, 1910, and A.J. Ferreira do Nascimento, *Manuel de Maia e a Planta de Lisboa*, Lisbon: Do Instituto Portugeês de Arqueologia e Etnografia, 1953.
32. I. Moita, *Lisboa e o Marquês de Pombal: Exposição Comemorativa do Bicentenario da Morte do Marquês de Pombal*, Lisbon: Museu da Cidade, 1982, Volume II, pp. 14-15.

33. Moita, 1982, *op. cit.* [32], Volume II, p. 15; F. de Vasconcelos, *Eugénio dos Santos: Arquitecto da Lisboa Pombalina*, Lisbon: Imprensa da Armada, 1934; L. de Pina Manique, *Plantas topográficas de Lisboa*, in Associação dos Arqueólogos Portugueses (eds), *Lisboa e Seu Termo: Estudos e Documentos*, Lisbon: Lisboa Associação dos Arqueólogos Portugueses, 1948, p. 189; and França, Lisbon of 1750-1850, the significance of its structural evolution, in R. Sayers (ed.), *Portugal and Brazil in Transition*, Minneapolis: University of Minnesota Press, 1968, pp. 266-68.
34. For a description of the origins of 'plain architecture' see G. Kubler, *Portuguese Plain Architecture: Between Spices and Diamonds 1521-1706*, Middletown, CO: Wesleyan University Press, 1972.
35. As Kubler and Soria wrote: "The Drift of Mardel's style is toward exotic and picturesque forms, though it was restrained by the traditional sobriety of Lisbon architecture". See G. Kubler and M. Soria, *Art and Architecture in Spain and Portugal*, Hammondsworth: Penguin, 1959, p. 114. Also see H. Wohl, Carlos Mardel and his Lisbon architecture, *Apollo*, 97 (1973), 350-59; and F. Sousa Viterbo, *Carlos Mardel: Novos Apontamentos para a sua Biografia*, Lisbon: Typografia Comércio, 1909.
36. The bulk of the reconstruction was carried out at an especially established location in the Casa do Risco das Reais Obras Públicas. Often under the direct supervision of Pombal, it was here that the technical and stylistic details were discussed and approved. It is interesting to note that the Casa do Risco was formed through the amalgamation of the rigorous, military-oriented Aula de Fortificação and the more expressive and stylistic Aula de Architectura Civil do Paço da Ribeira. The mixture of military engineers and civilian disciples of Ludovice must have created stimulating office debates! Above all, the mixture led to an infusion of ideas, techniques and styles that contributed to a sense of corporate and anonymous design. Even today, in some cases, there is significant debate over which architect was actually responsible for which project. Under such an arrangement it is not surprising that the label of Portuguese plain architecture was often applied to the result. De Matos Sequeira, 1916, *op. cit.* [5], pp. 33-39; Moira, 1982, *op. cit.* [32], p. 15; R. dos Santos, *História da Arte em Portugal*, Porto: Portucalense Editora, 1953, Volume III, p. 193; Smith, 1973, *op. cit.* [28], p. 315; Wohl, 1973, *op. cit.* [35], p. 350; and J.A. França, *A Reconstrução e a Architectura Pombalina*, Lisbon: Instituto de Cultura Portuguesa, 1978, p. 53.
37. These dissertations can be found in França, 1977, *op. cit.* [4], pp. 291-307; Ayres, 1910, *op. cit.* [31], pp. 25-53; and de Matos Sequeira, 1916, *op. cit.* [5], Volume I, pp. 33-38.
38. França, 1968, *op. cit.* [33], p. 266.
39. França, 1978, *op. cit.* [36], pp. 22-29.
40. Sousa, 1909, *op. cit.* [3], pp. 287-89.
41. Boxer, 1956, *op. cit.* [11], p. 20.
42. See Os programas de Manuel de Maia, in França, 1978, *op. cit.* [36], pp. 16-22. Maia's concern, given the history of the city, was justified. Major earthquakes

- had struck the city in the years 1344, 1551, 1595 and 1598. See Mendonça, 1758, *op. cit.* [1], pp. 44, 57, 61 and 68.
43. This point is made in Thomas Kendrick, *The Lisbon Earthquake*, London: Methuen, 1955, p. 47.
 44. França, 1977, *op. cit.* [4], p. 86.
 45. de Matos Sequeira, 1916, *op. cit.* [5], Volume I, p. 36 and Baretti, 1770, *op. cit.* [2], pp. 137-38.
 46. How much actual knowledge Pombal had of the Wren Plan is unknown. Cheke has written that he was influenced by the London experience but does not state the basis for his statement. See Cheke, 1969, *op. cit.* [10], p. 76.
 47. With the selection of the 'clean slate' option, the first step toward reconstruction was concretized. The city administration then evaluated the worth of all properties and developed procedures for inexpensive mortgages: provided that the owners agreed to rebuild to standard and followed the directions issued by the city within five years, they could use their properties as collateral. Interestingly, the worth of the rubble was included in the total value. If they did not build within five years, the property would be taken by the city and sold to a new owner. The city also realized that there would be significant concern about lost property due to road reconfiguration. The City Senate decided that this 'taking' would, in actuality, increase the value of their property by having a modern road passing in front of their structures. For disagreements, a court of appeals was established under the direction of the Ministry of Justice, Serrão, 1982-84, *op. cit.* [12], p. 74.
 48. For a summary of the importance of the 'Place Royale' in the eighteenth century city building see J. Summerson, *The Architecture of the Eighteenth Century*, New York: Thames and Hudson, 1988, pp. 134-61. Also see M. Dennis, *Court and Garden*, Cambridge, MA: The MIT Press, 1986, Chapter II.